



Is Sour Grapes Learnable?

A Computational and Experimental Approach

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1. Introduction

- Here I show that in an artificial language study involving Sour Grapes Harmony, humans behave more like a model with the expressive power to capture Sour Grapes than one that lacks this ability.

2. Sour Grapes

- Attested harmony patterns spread a **feature's value** from one edge of a phonological domain to the other, with spreading sometimes being stopped by **blocker** segments (Rose & Walker 2011).

/pitukutfu/ → [pitikitfi] /pitukatfu/ → [pitikatfu]

- In Sour Grapes, blocker segments block **any** spreading from occurring, with harmony otherwise acting normally (Bakovic, 2000; Wilson, 2006):

/pitukutfu/ → [pitikitfi] /pitukatfu/ → [pitikatfu]

- Typically, explanations for why Sour Grapes is unattested categorically limit the grammar so the pattern can't be represented (e.g., Wilson 2006; Heinz 2018).
- But past artificial language learning experiments have struggled to find evidence for such a limitation in human language acquisition:
 - Finley (2008) couldn't successfully train participants on any harmony with blockers.
 - Lin & Myers (2010) found a marginal preference **for** Sour Grapes in their participant's learning.

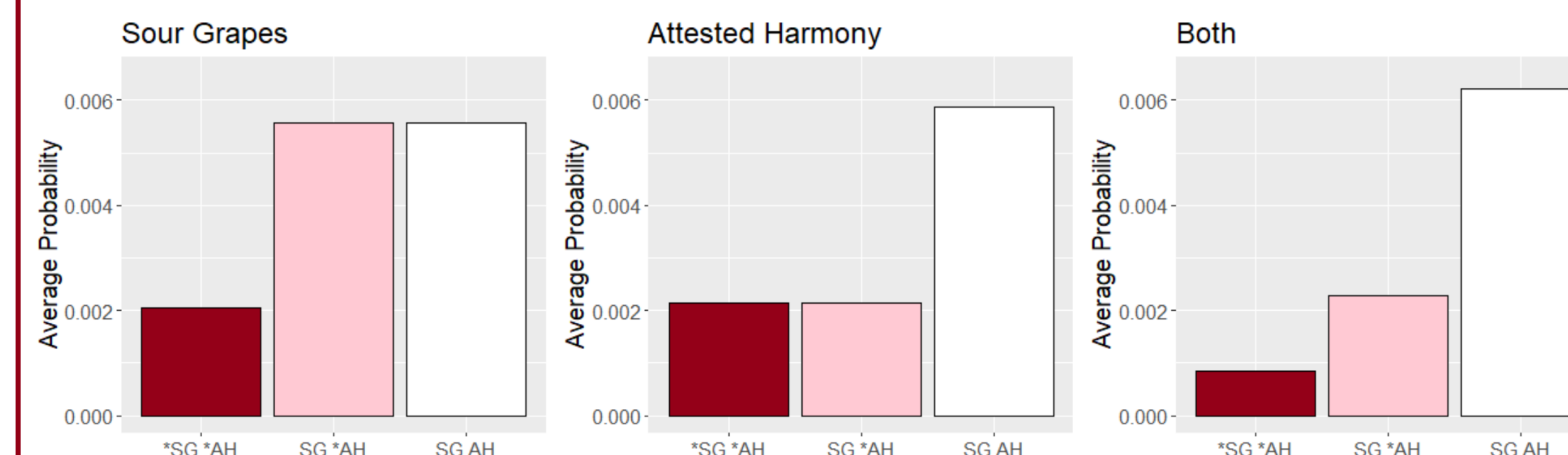
3. Design and Methods

- Participants were trained on surface forms that were grammatical in both **Sour Grapes (SG)** and **attested harmony (AH)**.
- The language had:
 - A vowel inventory of [i], [u], and [a]
 - Left-to-right backness harmony with [a] as a blocker
 - Words with all [i]'s, words with all [u]'s, and words that had both with a blocker in between.
- In testing, participants heard examples of three kinds of surface forms and were asked whether they belonged to the language from training:

	Description	Example
*SG, *AH	Ungrammatical in both patterns	[tipukut <u>fu</u>]
SG, *AH	Ungrammatical only in AH	[tipuka <u>t</u> fu]
SG, AH	Grammatical in both	[tipikit <u>fi</u>]

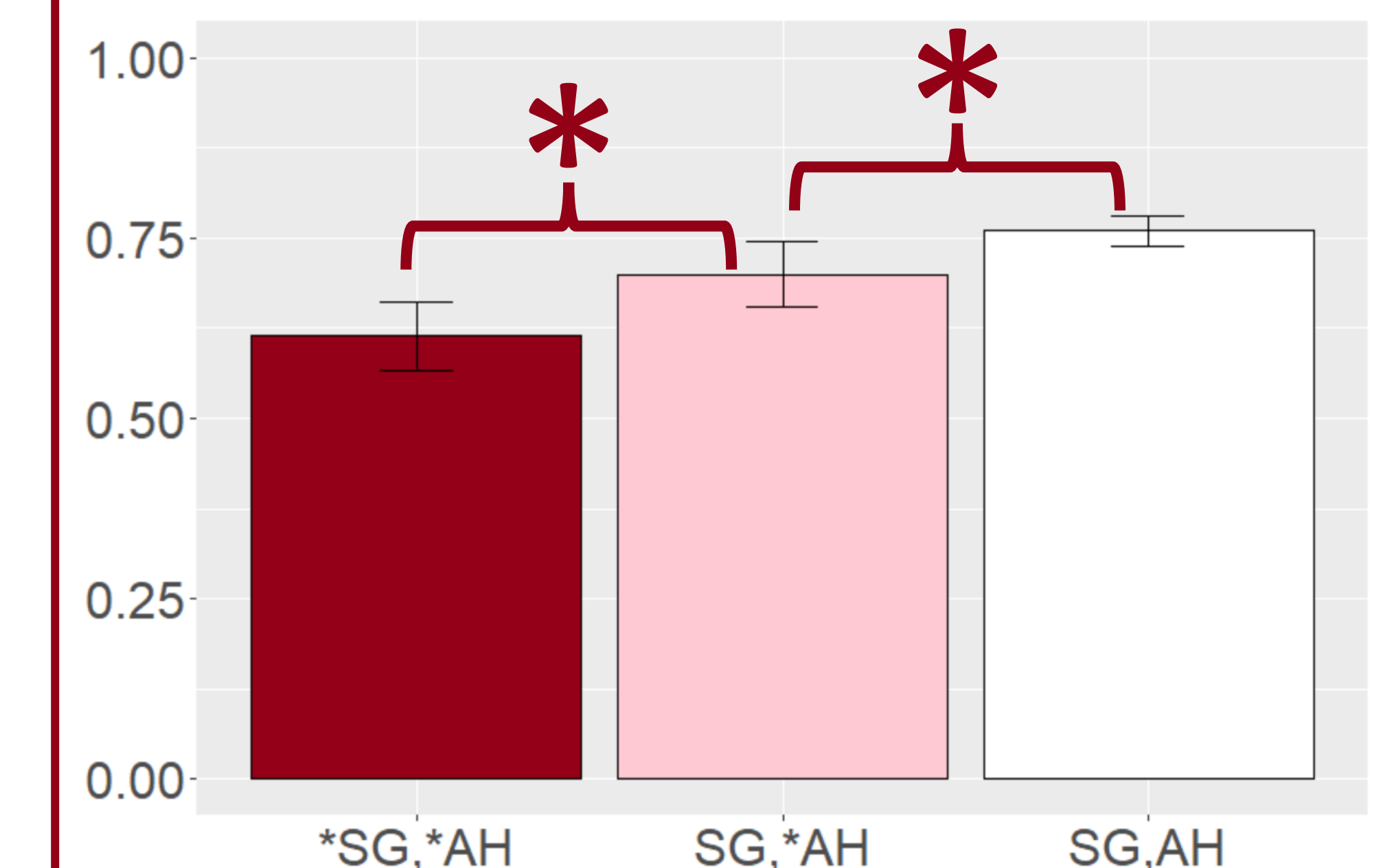
4. Predictions

- I trained 3 Maximum Entropy phonotactic learners (Hayes and Wilson 2008; Moreton et al. 2017) on the same kind of training data and then had them assign probabilities to the words from testing.
- The models differed in which harmony patterns they could represent: one could only represent Sour Grapes, one could only represent attested harmony, and one could represent both patterns.



5. Results

- The proportion of “Yes” responses in testing from participants:



- Participants preferred SG,AH words to SG,*AH ones (p=.019).
- They also preferred SG,*AH words to *SG,*AH ones (p=.009).

6. Conclusions

- These results showed that humans behaved most like the model that could represent **both** Sour Grapes and the attested pattern.
- This casts doubt on whether representing Sour Grapes in the grammar is categorically impossible.
- Future work should test the models used here to see if they predict Sour Grapes' typological absence (see, e.g., Staubs 2014; Hughto 2018; Beguš 2020; O'Hara 2021).